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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 09/162,992
Filing Date: September 30, 1998
Appellant(s): SENOO ET AL.

EXAMINER'S ANSWER

This is in response to the appeal brief filed 8/13/12 appealing from the Office action mailed 2/13/12.

(1) Real Party in Interest

The examiner has no comment on the statement, or lack of statement, identifying by name the real party in interest in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related interferences or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

Examiner notes the presently appealed application has been appealed to the Board previously. Applicant filed a previous appeal brief on 1/2/04 that resulted in the Board affirming the Examiner on 1/19/06. Applicant previously filed a second appeal brief on 12/6/10, however, after the Examiner's Answer mailed 2/14/11, Applicant filed a Request for Continued Examination on 4/14/11. The appeal brief filed 8/13/12 is the third appeal brief filed in the present application.

(3) Status of Claims

The following is a list of claims that are rejected and pending in the application:

Claims 26-32 and 35-41 are rejected and pending.

(4) Status of Amendments After Final

The examiner has no comment on the appellant's statement of the status of amendments after final rejection contained in the brief.

(5) Summary of Claimed Subject Matter

The examiner has no comment on the summary of claimed subject matter contained in the brief.

(6) Grounds of Rejection to be Reviewed on Appeal

The examiner has no comment on the appellant's statement of the grounds of rejection to be reviewed on appeal. Every ground of rejection set forth in the Office action from which the appeal is taken (as modified by any advisory actions) is being maintained by the examiner except for the grounds of rejection (if any) listed under the subheading "WITHDRAWN REJECTIONS." New grounds of rejection (if any) are provided under the subheading "NEW GROUNDS OF REJECTION."

(7) Claims Appendix

The examiner has no comment on the copy of the appealed claims contained in the Appendix to the appellant's brief.

(8) Evidence Relied Upon

5,772,934	MACFADDEN	6-1998
6,280,878	MARUYAMA ET AL.	8-2001
5,522,127	OZAKI ET AL.	6-1996
EP 0724305 A1	AKASHI	7-1996

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims Analysis

Note "comprises sintered meso-carbon micro-beads" in claim 26 and "the meso-carbon micro-beads are sintered at a temperature between 2500°C and 3500°C" in claim 39 are product-by-process limitations that are not given patentable weight, in the absence of unexpected results. The claims require a graphite material. The meso-

carbon micro-bead starting material used to obtain the graphite material is not given patentable weight in the absence of unexpected results. Page 9 of the specification defines a sintered meso-carbon microbead material as graphite.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 26-32 and 35-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over MacFadden, US 5,772,934 in view of Maruyama et al., US 6,280,878.

MacFadden teaches a lithium polymer battery comprising composite electrolyte-electrode sheets formed on current collectors that are then coated with solid polymer electrolyte (separate solid polymer electrolyte layer) prior to battery assembly (abstract). The SPE is located both internally and at the surface of the electrode structure (3:31-40). One or both of the electrodes of the battery can be further coated with additional SPE to provide an electrical insulator between electrodes of opposite polarity (5:27-40). The battery includes a cathode including a lithium transition metal compound (3:66-4:8), an anode including a carbon material such as graphite (4:9-15) and a solid polymer electrolyte (SPE) including a salt, a polymer and liquid. The electrolyte may include polyacrylonitrile (PAN) as the polymer, $LiPF_6$ as the salt and a mixture of ethylene carbonate and propylene carbonate in a ratio of 70:30 to 30:70 as the liquid (5:11-20). The anode and the cathode include a current collector (3:45-48). The polymer is in an

amount of 10-20 wt%, the liquid is in an amount of 65-75 wt% and the salt is in an amount of 5-12 wt% based on the SPE total weight (5:21-25). Example 2 has a specific teaching of 14 wt% $LiPF_6$ salt, 11 wt% PAN and 75 wt% of ethylene carbonate/propylene carbonate. Other liquids suitable for use as the solvent include dimethyl carbonate, diethyl carbonate and γ-butyrolactone (2:21-28). The polymer binder may comprise polyvinylidene fluoride (clm 6).

MacFadden is silent regarding the mean particle size of the graphite material. However, Maruyama teaches a lithium secondary gel electrolyte battery (title; abstract). The battery includes an electrode comprising a carbon active material. The carbon active material is preferably graphite having a mean particle size of 1 to 30 μm, especially 5 to 25 μm. Therefore, the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because a smaller mean particle size tends to reduce the charge/discharge cycle life and to increase the variation of capacity. A larger mean particle size would lead to a significantly greater variation of capacity and a lower average capacity. It is believed that a variation of capacity results from a larger mean particle size because the contact of graphite with the collector and the contact between graphite particles become inconsistent (5:9-20). Thus, one of skill would have been motivated to provide the graphite particles of MacFadden with the mean particle size disclosed by Maruyama.

While MacFadden does not explicitly state the number average molecular weight of the PAN, this limitation is considered obvious in view of the teaching by MacFadden that PAN may be used as the polymer of the SPE. Regarding claim 30, Maruyama

teaches the concentration of the electrolyte salt (such as $LiPF_6$) in the electrolytic solution is preferably about 0.1 to 5 mol/liter and that maximum conductivity is generally available at a concentration of about 1 mol/liter (5:34-50). See also Example 1 of Maruyama. The limitation "comprises sintered meso-carbon micro-beads" is a product-by-process limitation that is not given patentable weight.

*

Claims 26-32 and 35-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over MacFadden, US 5,772,934 in view of Ozaki et al., US 5,522,127.

MacFadden teaches a lithium polymer battery comprising composite electrolyte-electrode sheets formed on current collectors that are then coated with solid polymer electrolyte (separate solid polymer electrolyte layer) prior to battery assembly (abstract). The SPE is located both internally and at the surface of the electrode structure (3:31-40). One or both of the electrodes of the battery can be further coated with additional SPE to provide an electrical insulator between electrodes of opposite polarity (5:27-40). The battery includes a cathode including a lithium transition metal compound (3:66-4:8), an anode including a carbon material such as graphite (4:9-15) and a solid polymer electrolyte (SPE) including a salt, a polymer and liquid. The electrolyte may include polyacrylonitrile (PAN) as the polymer, $LiPF_6$ as the salt and a mixture of ethylene carbonate and propylene carbonate in a ratio of 70:30 to 30:70 as the liquid (5:11-20). The anode and the cathode include a current collector (3:45-48). The polymer is in an amount of 10-20 wt%, the liquid is in an amount of 65-75 wt% and the salt is in an amount of 5-12 wt% based on the SPE total weight (5:21-25). Example 2 has a specific

teaching of 14 wt% $LiPF_6$ salt, 11 wt% PAN and 75 wt% of ethylene carbonate/propylene carbonate. Other liquids suitable for use as the solvent include dimethyl carbonate, diethyl carbonate and γ-butyrolactone (2:21-28). The polymer binder may comprise polyvinylidene fluoride (clm 6).

MacFadden does not explicitly teach the graphite material has a mean particle size of 5 to 100 μm. MacFadden does not explicitly teach the graphite material comprises sintered meso-carbon micro beads.

However, Ozaki teaches a non-aqueous electrolyte secondary cell having a negative electrode of carbon material to which intercalation by charging and deintercalation by discharging of lithium is possible (1:8-12). The negative electrode is made from mesophase graphite particles. The mesophase graphite particles are produced from micro beads of mesophase carbon made from pitch (3:1-7). The average particle diameter of the graphite particles is in the range of 3-10 μm, preferably 5-7 μm (6:35-43). A favorable range of the specific surface area of the mesophase graphite particles is 1.0 to 8.0 m^2/g, preferably 2.5 to 5.0 m^2/g. The graphitization temperature of the mesophase carbon microbeads is in the range of 2400-3000°C, preferably 2600-2800°C to obtain fully graphitized carbon material (6:50-65). The negative electrode was fabricated by mixing the mesophase graphite particles with styrene butadiene rubber (binder) to obtain a paste. A copper foil (current collector) of 0.02 mm thickness was coated with the paste of both surfaces. The concentration of $LiPF_6$ with respect to the non-aqueous solvent is 1 mol/l (mol/cm^3) (4:55-58).

Therefore, the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because one of skill would have found it obvious to use the negative electrode of Ozaki for the negative electrode of MacFadden. Ozaki teaches that the negative electrode including mesophase graphite leads to smooth intercalating of lithium at charging over a wide temperature range resulting in an increased cell capacity (3:12-14). MacFadden teaches the negative electrode may be a carbonaceous material, preferably graphite, capable of intercalating lithium. Both Ozaki and MacFadden teach nonaqueous secondary cells having a negative electrode including graphite and a nonaqueous electrolyte comprising a lithium salt and a mixed solvent (4:54-58 of Ozaki). One of skill would have been motivated to use the graphite negative electrode of Ozaki as the graphite negative electrode of MacFadden because both materials are capable of intercalating lithium and the graphite negative electrode of Ozaki leads to increased cell capacity.

While MacFadden does not explicitly state the number average molecular weight of the PAN, this limitation is considered obvious in view of the teaching by MacFadden that PAN may be used as the polymer of the SPE.

*

Claims 26-32 and 35-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Akashi, EP 0724305 in view of Ozaki et al., US 5,522,127.

Akashi teaches a gel electrolyte and a lithium secondary cell using the gel electrolyte. The cell includes a positive electrode which may be a lithium/transition metal composite oxide, a negative electrode which may be a carbonaceous material

such as graphite and the gel electrolyte (5:8:16). The non-aqueous solvent and the electrolyte salt used for the production of the gel electrolyte may be those generally used for the production of a lithium secondary cell. The solvent may preferably be ethylene carbonate (EC), propylene carbonate (PC), γ-butyl lactone or mixtures thereof. The preferred salt is $LiPF_6$. A mixture containing EC and PC in combination is preferred (4:1-12). The gel electrolyte further includes a polymer having a side chain to which at least one nitrile group is bonded. The polymer is preferably polyacrylonitrile (PAN) and has a number-average molecular weight ranging from about 50,000 to 500,000 (3:45-59). A molar ratio of a monomer as a repeating unit of the PAN to the non-aqueous solvent is suitably in the range of 5:95 to 30:70 though it varies depending upon kinds of the non-aqueous solvent, the gelling agent and the electrolyte salt used. The lithium salt may be in a concentration of 0.4 to 2 M (4:13-17; 31-32). Tables 1 & 2 teach a gel electrolyte including PAN, EC and PC where PC is 10-38 mol% of the gel electrolyte.

Akashi does not specifically teach the negative electrode of claim 26. Akashi teaches lithium secondary cells are well known to have a negative electrode made of a material such as lithium, a lithium alloy or a carbonaceous material capable of occluding lithium (2:12-17). Akashi further teaches examples of suitable negative electrode activating ingredients may include lithium, a lithium alloy and a carbonaceous material capable of occluding lithium, such as graphite (5:12-16).

However, Ozaki teaches a non-aqueous electrolyte secondary cell having a negative electrode of carbon material to which intercalation by charging and deintercalation by discharging of lithium is possible (1:8-12). The negative electrode is

made from mesophase graphite particles. The mesophase graphite particles are produced from micro beads of mesophase carbon made from pitch (3:1-7). The average particle diameter of the graphite particles is in the range of 3-10 μm, preferably 5-7 μm (6:35-43). A favorable range of the specific surface area of the mesophase graphite particles is 1.0 to 8.0 m^2/g, preferably 2.5 to 5.0 m^2/g. The graphitization temperature of the mesophase carbon microbeads is in the range of 2400-3000°C, preferably 2600-2800°C to obtain fully graphitized carbon material (6:50-65). The negative electrode was fabricated by mixing the mesophase graphite particles with styrene butadiene rubber (binder) to obtain a paste. A copper foil (current collector) of 0.02 mm thickness was coated with the paste of both surfaces.

Therefore, the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because one of skill would have found it obvious to use the negative electrode of Ozaki for the negative electrode of Akashi. Ozaki teaches that the negative electrode including mesophase graphite leads to smooth intercalating of lithium at charging over a wide temperature range resulting in an increased cell capacity (3:12-14). Akashi teaches the negative electrode may be a carbonaceous material such as graphite that is capable of occluding lithium (intercalating). Both Ozaki and Akashi teach nonaqueous secondary cells having a negative electrode including graphite and a nonaqueous electrolyte comprising a lithium salt and a mixed solvent (4:54-58 of Ozaki). One of skill would have been motivated to use the graphite negative electrode of Ozaki as the graphite negative electrode of Akashi because both materials are capable of intercalating lithium and the graphite

negative electrode of Ozaki leads to increased cell capacity. Akashi teaches polyvinylidene fluoride is a known electrode binder (page 10, lines 33-34).

(10) Response to Argument

Applicant's arguments have been fully considered but they are not persuasive.

Applicant argues the claims do not recite a graphite material, but instead expressly require that the negative electrode active material is sintered mesocarbon micro-beads. The present application (page 9) discloses the sintered mesocarbon micro-beads is graphite. Applicant's attempt to define the graphite material via the process used to produce the graphite (sintering meso-carbon microbeads) does not negate the fact that the claims require a graphite material.

<u>35 USC 103(a) rejection: MacFadden in view of Maruyama</u>

Applicant argues "by providing propylene carbonate in combination with the claimed graphite material, an improved charge/discharge efficiency can be obtained". Applicant points to Tables 1 & 2 of the present specification for support. However, Applicant's argument that the claimed invention has improved charge/discharge efficiency is not persuasive because the comparative examples of Tables 1 & 2 in the present specification are clearly not representative of MacFadden and/or Maruyama. Applicant must compare and attempt to distinguish the claimed invention over the cited prior art (not unrelated comparative examples in the present specification). Furthermore, at least Tables 1 & 2 of Maruyama (col. 9) teaches the capacity retention of E1 and E2 is 90% after 30 cycles. Examiner notes Example 1 (E1) of Maruyama teaches a secondary battery having a gel electrolyte including an electrolyte salt

($LiClO_4$), a nonaqueous solvent (ethylene carbonate/propylene carbonate (EC:PC=3:1)) and a high molecular weight material (P(VDF-HFP)). The battery of E1 includes a positive electrode and a negative electrode. The negative electrode comprises a current collector and a graphite active material. Maruyama teaches the carbon active material is preferably graphite having a mean particle size of 1 to 30 μm, especially 5 to 25 μm (5:10-13). The only limitation of claim 26 not disclosed by Maruyama is the process limitation "sintered meso-carbon micro-beads", which has not been given patentable weight.

Applicant argues the present specification demonstrates significantly higher initial charging/discharging efficiency (unexpected result asserted) for a graphite material made from sintered meso-carbon micro-beads (page 9 of Brief) and points to Tables 1 & 2 in the present specification. However, at least Tables 1 & 2 of Maruyama (col. 9) teaches the capacity retention (charge/discharge efficiency) of E1 and E2 is 90% after 30 cycles. Thus, it is unclear how Applicant concludes the claimed invention has unexpected results. Specifically the present specification does not demonstrate significantly higher initial charging/discharging efficiency when compared to Maruyama.

Applicant argues the process limitations should be given patentable weight and cites case law in an attempt to support the argument. However, Applicant merely mentions the cases with no analysis of how the specifics of the cited cases apply to the presently claimed invention. Applicant has not stated how the limitation "sintered meso-carbon micro-beads" defines the product in a way that distinguish the claimed invention over the cited prior art. Note Maruyama teaches the carbon active material is preferably

graphite having a mean particle size of 1 to 30 μm, especially 5 to 25 μm and at least Tables 1 & 2 of Maruyama (col. 9) teaches the capacity retention of E1 and E2 is 90% after 30 cycles. Applicant has not stated how the limitation "sintered meso-carbon micro-beads" results in a product whose physical properties vary widely from the graphite material of the cited prior art. Applicant has not shown the claimed product is new and not obvious over the cited references. Thus the cited cases do not appear to be relevant to the rejections of record.

Applicant asserts unexpected results are shown in Tables 1 & 2 of the specification. However, Comparative Examples 1 & 2 are not representative of the prior art of record. Maruyama teaches a graphite material having a mean particle size of 5-100 μm. The process used to produce the negative electrode in Comparative Examples 1 and 2 is not the process used to produce the negative electrode of MacFadden and/or Maruyama. Note any evidence of unexpected results must distinguish the claimed invention over the prior art of record. Also, Examples 1-4 of the present specification are not commensurate in scope with the claimed invention (no mean particle size disclosed). Furthermore, there are numerous differences between the process used to produce the negative electrode of Examples 1-3 and the process used to produce the negative electrode of comparative Examples 1 and 2. Therefore, Tables 1 & 2, [78-79], [82], [87-88] and [91-93] of the present specification do not provide evidence of unexpected results over the cited prior art for the process limitation "sintered meso-carbon micro-beads".

<u>35 USC 103(a) rejection: MacFadden in view of Ozaki</u>

Applicant argues Ozaki suggests that propylene carbonate is disfavored. **This argument has been addressed previously in this application by the Board of Patent Appeals on 1/19/06 and has been determined to be non-persuasive.** Applicant has neither addressed the Examiner's motivation for combining MacFadden and Ozaki nor shown the claimed negative electrode material has unexpected properties over the negative electrode material disclosed by Ozaki. Applicant states Ozaki teaches that propylene carbonate is not suitable for use with mesophase particles because it decomposes to generate a gas during charging. Examiner points out the claims on appeal require as little as 10 mol% of propylene carbonate. Ozaki is not cited to teach the components of the gel electrolyte. MacFadden teaches a graphite negative electrode active material in combination with an electrolyte solvent containing propylene carbonate.

Examiner points out that the section of Ozaki cited by Applicant as assertedly teaching away from the claimed invention (col. 2, lines 3-6) is part of the background section of Ozaki. Ozaki teaches a non-aqueous electrolyte secondary cell having a negative electrode of carbon material to which intercalation by charging and deintercalation by discharging of lithium is possible (1:8-12). The negative electrode is made from mesophase graphite particles. The mesophase graphite particles are produced from micro beads of mesophase carbon made from pitch (3:1-7). The average particle diameter of the graphite particles is in the range of 3-10 μm, preferably 5-7 μm (6:35-43). Tables 1 and 2 are not applicable to the rejection of record because

Ozaki teaches mesophase graphite particles (not fired petroleum coke as required by Comparative Examples 1 and 2).

One having ordinary skill would have found it obvious to use the negative electrode of Ozaki for the negative electrode of MacFadden. Ozaki teaches that the negative electrode including mesophase graphite leads to smooth intercalating of lithium at charging over a wide temperature range resulting in an increased cell capacity (3:12-14). MacFadden teaches the negative electrode may be a carbonaceous material, preferably graphite, capable of intercalating lithium. Both Ozaki and MacFadden teach nonaqueous secondary cells having a negative electrode including graphite and a nonaqueous electrolyte comprising a lithium salt and a mixed solvent (4:54-58 of Ozaki). One of skill would have been motivated to use the graphite negative electrode of Ozaki as the graphite negative electrode of MacFadden because both materials are capable of intercalating lithium and the graphite negative electrode of Ozaki leads to increased cell capacity. MacFadden discloses the electrolyte may include a mixture of ethylene carbonate and propylene carbonate in a ratio of 70:30 to 30:70 as the liquid (5:11-20).

Furthermore, as pointed out by the Board (page 5 of 1/19/06 decision), "Nor have appellants established that the use of propylene carbonate as the only solvent in appellant's secondary cell would not experience the disadvantageous decomposition of propylene carbonate with the evolution of gas taught by Ozaki".

Applicant continues to argue the references separately when the rejection is based upon the combination of MacFadden and Ozaki. MacFadden teaches the

claimed gel electrolyte including the claimed solvent combination of ethylene carbonate and 10-75 mol% propylene carbonate. MacFadden teaches the negative electrode may be a carbon material such as graphite. Ozaki teaches the claimed graphite material obtained by sintering mesocarbon micro-beads. Ozaki teaches that the negative electrode including mesophase graphite leads to smooth intercalating of lithium at charging over a wide temperature range resulting in an increased cell capacity (3:12-14). MacFadden teaches the negative electrode may be a carbonaceous material, preferably graphite, capable of intercalating lithium. Both Ozaki and MacFadden teach nonaqueous secondary cells having a negative electrode including graphite and a nonaqueous electrolyte comprising a lithium salt and a mixed solvent (4:54-58 of Ozaki). One of skill would have been motivated to use the graphite negative electrode of Ozaki as the graphite negative electrode of MacFadden because both materials are capable of intercalating lithium and the graphite negative electrode of Ozaki leads to increased cell capacity.

In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971). Applicant has not identified any “knowledge gleaned only from the applicant’s

disclosure". Nor has Applicant addressed the Examiner motivation for combining MacFadden and Ozaki. Thus, Applicant's argument is not persuasive.

35 USC 103(a) rejection: Akashi in view of Ozaki

Applicant asserts the skilled artisan would have no reason to combine Akashi and Ozaki to arrive at the present claims for reasons similar to those set forth above. Applicant argues Ozaki teaches away from using its sintered mesophase carbon particles with propylene carbonate. This exact rejection and argument have previously been before the Board. The decision of 1/19/06 affirmed the Examiner and deemed this argument not persuasive.

The specification does not provide unexpected results over the prior art of record because the combination of Akashi and Ozaki renders the claimed invention obvious. Comparative Examples 1 and 2 of the present specification are not representative of the teaching of Akashi in view of Ozaki.

Applicant argues Akashi does not teach or suggest a negative electrode material that includes a graphitized carbonaceous material obtained from meso-carbon microbeads (page 7, lines 7-10). In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). The cited art (Akashi and Ozaki) teach all of the features of the claimed invention. Akashi teaches the gel electrolyte of the claimed invention and Ozaki teaches the negative electrode of the claimed invention. Akashi

suggests the negative electrode of the claimed invention because the reference teaches the negative electrode may be a carbonaceous material such as graphite (5:12-16).

It is important to point out that Akashi teaches a negative electrode comprising a graphitized carbonaceous material. Akashi does not teach how the graphitized carbonaceous material is produced. Thus, since the limitation “sintered meso-carbon micro-beads” is a product-by-process limitation, the burden shifts to Applicant to provide an unobvious or unexpected difference between Akashi and the claimed invention (MPEP 2113). Applicant has not provided any evidence of an unobvious or unexpected difference between Akashi and the claimed invention. Furthermore, Applicant’s arguments with respect to the process limitation are not relevant because Ozaki teaches the limitation.

Applicant argues Akashi and the claimed invention seek to solve different problems in the art. Applicant argues the claimed invention can provide enhanced discharge capacity and charging/discharging efficiency (page 8, lines 3-10). An object of the invention of Akashi is to provide a cell exhibiting an excellent discharge capacity (2:46-47). Furthermore, Figure 5 of Akashi shows charging and discharging efficiencies of the cells were 90% or higher at both the second and fifth charging and discharging cycles (11:15-17). Thus, this argument is not convincing.

Applicants main argument is that the Patent Office cannot rely solely of Ozaki to remedy the deficiencies of Akashi because the teachings are not combinable (page 8, lines 11+). Applicant argues Ozaki teaches away from its combination with Akashi because Ozaki disfavors the use of propylene carbonate as an organic solvent of the

electrolyte (required by pending claims). Ozaki states "propylene carbonate is not employed because it decomposes to generate a gas during charging" (7:6-8). However, Ozaki is not applied to teach the electrolyte of the instant claims. Ozaki teaches a negative electrode comprising a graphitized carbonaceous material obtained from a plurality of meso-carbon micro-beads is known in the art. One of skill would have been motivated to use the negative electrode of Ozaki for the negative electrode of Akashi because Akashi clearly suggests a negative electrode comprising a graphitized carbonaceous material. Furthermore, it is well known in the art that propylene carbonate decomposes when contacted with a graphite negative electrode. Applicants own disclosure teaches in non-aqueous electrolyte cells employing propylene carbonate as a main solvent and graphite type carbonaceous materials as a negative electrode, propylene carbonate is decomposed in a known manner on the negative electrode with gas evolution (page 5, lines 6-17). It is important to point out that the Ozaki reference teaches propylene carbonate is not favorable as the only solvent. The claims only require as little as 10 mol% of propylene carbonate. Furthermore, the specification indicates that the claimed invention also results in decomposition of propylene carbonate. On page 6, line 1-3 the specification states a graphite material of smaller particle size is less susceptible to decomposition of propylene carbonate, which suppresses the discharge capacity loss. On page 11, lines 7-12 the specification states the claimed negative electrode graphitized carbonaceous material suppresses discharge capacity losses. This indicates that the propylene carbonate of the claimed secondary cell does, at least to some degree, undergo decomposition. Examiner

emphasizes that Akashi teaches combining a graphite negative electrode with an electrolyte containing propylene carbonate. Thus, the prior art does teach and suggest using a propylene carbonate solvent for the electrolyte with a graphitized carbonaceous material negative electrode.

Thus the argument that the references are not combinable is not convincing for at least the following reason:

1. Ozaki is applied as a secondary reference to teach a known negative electrode material comprising a graphitized carbonaceous material obtained from a plurality of meso-carbon micro-beads. Ozaki is not applied to teach the electrolyte of the claimed invention (taught by primary reference);

2. The claimed invention is not limited to a propylene carbonate solvent that does not decompose in the presence of the graphite negative electrode. The invention only indicates that the decomposition is "suppressed"; and

3. The combination of the claimed electrolyte with a graphitized carbonaceous material is taught by the prior art. Akashi teaches and suggests using a propylene carbonate solvent for the electrolyte with a graphitized carbonaceous material negative electrode.

Ozaki teaches that the use of the graphitized carbonaceous material obtained from a plurality of meso-carbon micro-beads lead to increased cell capacity due to smooth intercalating of lithium at charging (3:12-14). Akashi teaches the claimed secondary cell expect for the negative electrode. However, Akashi at least suggests the negative electrode of claimed invention because Akashi teaches the negative electrode

may be a carbonaceous material such as graphite (5:12-16). Both Ozaki and Akashi teach non-aqueous secondary cells having a negative electrode including graphite. Thus the references are combinable.

In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning (page 9, lines 10-19), it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971). Note the sections of the specification that teach propylene carbonate decomposes in the presence of a graphite negative electrode are contained in the Background of the Invention part of the disclosure. This is considered admitted prior art ("decomposed in a <u>known</u> manner", page 5, line 8).

Accordingly, Examiner respectfully requests that the rejection under 35 U.S.C. 103(a) be sustained.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/TRACY DOVE/

Primary Examiner, Art Unit 1726

Conferees:

/Patrick Joseph Ryan/

Supervisory Patent Examiner, Art Unit 1726

/William Krynski/

Quality Assurance Specialist, TC 1700